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HERBIVORE GRAZING ON *THALASSIA TESTUDINUM* AS A FUNCTION OF DISTANCE FROM CORAL PATCHES

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Abstract. (JLM & NDP) Turtlegrass, *Thalassia testudinum*, is a common food source for herbivorous fish in reef lagoons. Occasionally isolated coral patches occur within *Thalassia* beds. We observed higher fish densities in these coral patches at Discovery Bay, Jamaica, possibly due to the predator protection they offer. Therefore, we expected herbivory on *Thalassia* to be greater near the patches. We tested this hypothesis by comparing herbivory on blades of *Thalassia* placed near to (10 cm) and far from (6 m) coral patches. No significant difference in the percent area damaged between the two treatments were found, indicating that herbivory rates are similar between coral patches and *Thalassia* beds. Thus, protection from predators may not be as critical to herbivorous fish at Discovery Bay, where large predators may occur in low numbers.

INTRODUCTION (JLM)

In the shallow waters off Jamaican reefs, beds of turtlegrass, *Thalassia testudinum*, commonly occur. The long-spined black urchin, *Diadema antillarum*, as well as coral reef fishes, including parrotfish (Scaridae), doctorfish and ocean surgeons (Acanthuridae), feed upon *Thalassia* (Gilbert pers. comm.).

Within *Thalassia* beds, patches of coral outcroppings can be found. Personal observations have shown that coral reef fish density tends to be higher in these coral patches than in the surrounding *Thalassia* beds. This is most likely because the structure of the coral provides a safe haven for fish, where they can hide from predators in cracks and crevices (Kaplan 1982). Another reason for higher herbivorous fish density near coral patches is the abundance of algae on which they also feed (Kaplan 1982).

Due to this higher fish density in coral patches, we hypothesize that rates of herbivory will be higher on *Thalassia* blades located near coral patches than blades located within *Thalassia* beds several meters away from a coral patch.

METHODS (NDP)

On 21 February 1995, we collected 120 ungrazed *Thalassia* blades with varying epibiont loads from the lagoon west of the Discovery Bay Marine Laboratory dock, Jamaica. We standardized each blade to 16.5 cm length by cutting the blade at the base. We divided the blades into ten sets of 12 blades. Each set of 12 blades was held by two clothespins, six blades per clothespin, anchored to a bolt. Collected blades were kept in running sea water until the experiment was run.

On 23 February 1995 we identified five coral patches in the lagoon. At each patch, we placed one bolt within 10 cm of the coral structure. A second bolt was then placed in the nearest *Thalassia* bed 6 m away from each of the five coral patches.

We collected all bolts 24 hours later and determined the percent area damaged by herbivores on each blade. We used a Wilcoxon matched-pairs signed-rank test to compare the percent herbivory between treatments because the variance between treatments was not equal.

RESULTS (NDP)

All herbivory on *Thalassia* was by fish as evidenced by the neat, scalloped bites

we observed on the blades. Had any sea urchin herbivory occurred, we would have seen rough, jagged edges on the blades; we observed none of this type of damage. On average, *Thalassia* blades near coral patches lost more leaf area to herbivory (mean ± 1 SE), 21.7% (± 3.99), than blades farther from patches, 12.9% (± 2.34) (Fig. 1). However, this difference was not statistically significant (Z=-0.7373, df=1, n=59, P=0.4609).

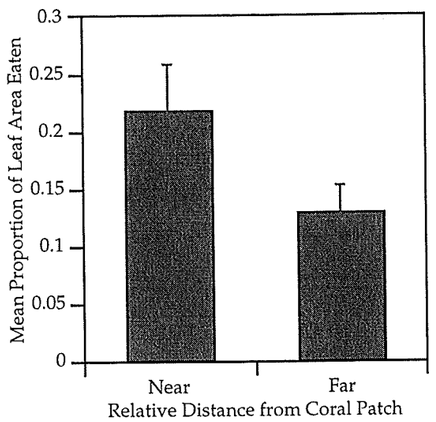

FIG 1. Mean proportion of leaf area eaten (± SE) of *Thalassia* blades near to (10 cm) and far from (6 m) five isolated coral patches, n=59 blades/treatment.

DISCUSSION (SDK)

We found no significant difference between herbivore grazing damage on *Thalassia* near coral patches and grazing in *Thalassia* beds far from these coral patches. Although we qualitatively observed that fish densities are higher near coral patches, other factors besides increased herbivore abundance seem to influence grazing damage on *Thalassia*. We hypothesized that fish seek out coral patches as shelters from large, piscivorous fish. However, due to increases in trapping of large predators, the population of piscivorous fish in Discovery Bay, Jamaica, is unusually low (Gilbert, pers. comm.). Decreased numbers of predators in the area reduces the need for herbivorous fish to seek protective coral refuges. Thus, the local lack of large piscivores may allow herbivorous fish a wider range of feeding activity in the more exposed *Thalassia* beds.

We did find higher mean leaf area damage on *Thalassia* blades near to coral patches than far from them (Fig. 1). However, because this did not represent a significant trend, perhaps other factors may have obscured any quantitative differences in herbivore effects on *Thalassia* between patch and bed habitats. Two such complicating factors are damselfish territorial defense and high variation in damage on *Thalassia* blades.

Coral patches provide favorable substrates for macroalgae growth. As such, these patches are well-guarded by damselfish which depend on algal gardens for zooplankton and algae food resources. These territorial damselfish aggressively chase herbivorous intruders away from coral patches. Other studies have examined the effect of damselfish territoriality on herbivore damage to *Thalassia* (Abram et al. 1994), and found that herbivory was decreased in defended territories. Thus, the presence of a territorial damselfish on a coral patch may prevent access of other herbivores to algae and *Thalassia* blades. We noted that at least one near-patch sample, which experienced unusually low herbivore damage (only one out of 12 leaves was bitten), was located near an aggressive, territorial *Stegastes planifrons*. Future studies should take care to place sample blades near undefended coral patches.

We also observed high variation in *Thalassia* blade herbivory damage within far and near treatments of all sites, indicating that perhaps more sample replicates are needed to accurately assess herbivory damage. However, it seems that fish do not differentially graze *Thalassia* near or far from coral patches. Due to the absence of large predators, herbivorous fish in Discovery Bay may not experience substantial predation pressure and are more likely to spend time foraging in exposed *Thalassia* beds where there is a greater

abundance of edible plant and epibiont material.

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